

MEASUREMENT OF ELECTROCARDIOGRAPHY

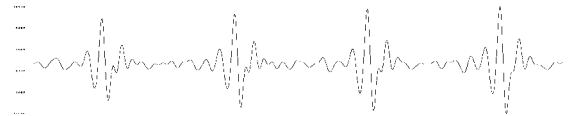
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Quasi-periodic signals

The biological signals are often quasi-periodic

Characterization of quasi-periodic signals:

- Amplitude parameters
- Frequency parameters
- The length of specific intervals within a period

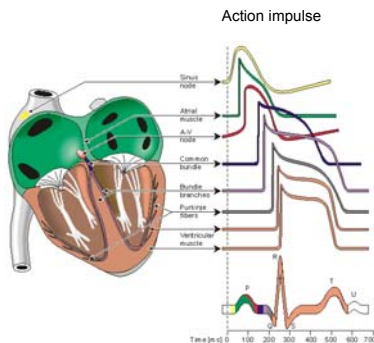


Background – the Electrocardiogram (ECG)

Specialized pacemaker cells start the **electrical sequence** of depolarization and repolarization

The **electrical signal** is generated by the sinoatrial (SA) node and spreads to the ventricular muscle

The **electrical activities** of the heart can be detected on the body surface via surface electrodes

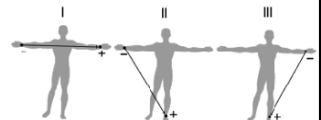


Background – Electrode leads

The arrangement of electrodes is a lead

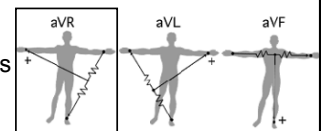
Bipolar (Einthoven)

- Standard Lead I, II and III form a triangle where the heart electrically constitutes the null point.
- Einthoven's Triangle is used when determining the electrical axis of the heart.



Unipolar augmented leads

- aVR: right arm
- aVL: left arm
- aVF: left foot

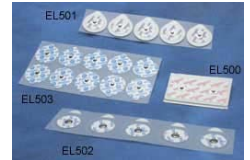


Experimental objectives

- To become familiar with the measurement of electrocardiograph
- To observe rate and rhythm changes in the ECG associated with body position and exercise
 - Detect the current heart rate for the study period
 - Identify specific time intervals
 - Length of R-R intervals (complete heart cycle)
 - Length of QT intervals (ventricular systole)
 - Determine their ratio in rest and after exercise

Accessories used

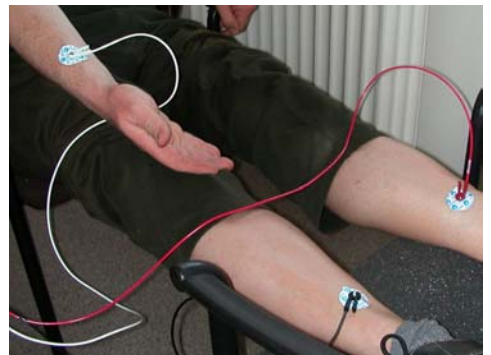
- Electrode Lead Set
- Disposable Electrodes
- Electrode Gel



Tasks performed by the student

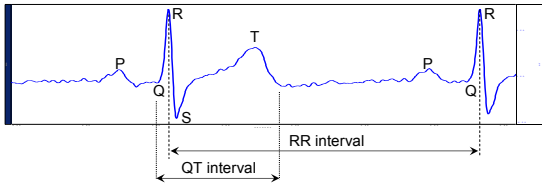
- Place the electrodes to right wrists and both ankles
- Lay down and relax
 - record normal resting ECG in laying position
- Sit down and relax
 - record normal resting ECG in sitting position
- Perform a physical exercise
 - Record ECG after exercise

Electrode lead set



Data analyses

- Zoom-in for a closer look at an individual ECG complex
- Determine the characteristic duration parameters in supine, sitting and after exercise for 3 cycles each
 - QT (ventricular systole), RR interval (complete heart cycle)



- Calculate the current heart rate in BMP for supine, sitting and after exercise